

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

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**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY**

In the Matter of)

Amendments of Parts 2 and 15)

of the Commission's Rules to Permit)

Use of Radio Frequencies Above 40 GHz)

for New Radio Applications)

ET Docket No. 94-124

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**COMMENTS OF HEWLETT-PACKARD COMPANY REGARDING
INTERNATIONAL HARMONIZATION OF
FREQUENCY BANDS ABOVE 40 GHz**

Hewlett-Packard Company ("HP") is pleased to submit supplemental comments to the above-referenced proceeding as a response to the June 23, 1995 Federal Communications Commission ("FCC" or "Commission") Public Notice, requesting comment on international harmonization of frequency bands above 40 GHz.

HP applauds the leaders of the government organizations in Europe and the U.S. for reaching out to the private sector for input on the important issue of global alignment of spectrum allocation.

HP strongly believes that allocation of the spectrum and international coordination of operational rules are critically important to ensure successful and efficient use of the spectrum.

HP is a global company with facilities in 110 countries around the world. The company designs and manufactures more than 20,000 products including computers, test and measurement instruments and computerized test systems, electronic components, medical equipment and instruments and systems for chemical analysis. Last year more than half of our \$25 billion net revenue was earned outside of the U.S.; two-thirds of that in Europe. The company employs approximately

92,600 people, of whom 20,000 work in Europe. Our continuing growth is based on a strong commitment to research and development. HP invests about 8 percent of its net revenue in R&D. More than half of the company's orders last year were for products introduced during the last two years.

I. IMPORTANCE OF MILLIMETER WAVES AS ENABLING TECHNOLOGY

The merging of measurement, computing and communication technologies is revolutionizing the way people gather and share information. Emerging global networks and specialized "information appliances" will help people to share information easily any time, anywhere. HP believes that millimeter wave ("mmWave") is an enabling technology through which such devices as "smart" radios will have the capability to help users perform wide variety of tasks wherever they are located.

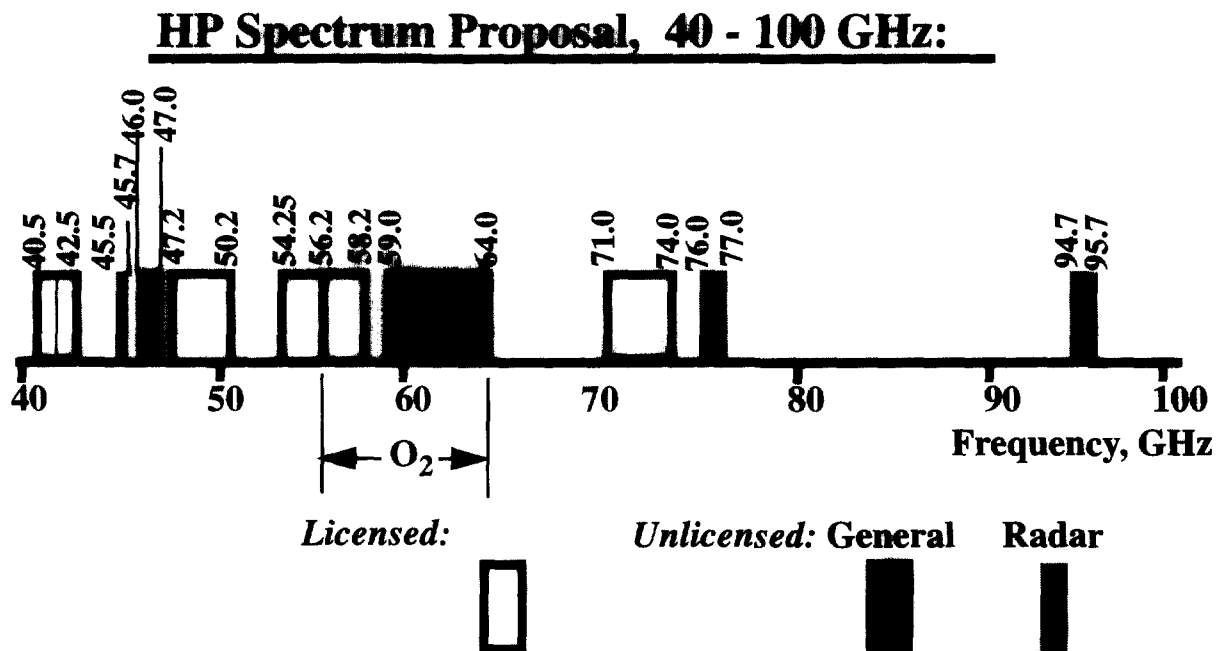
In the past, most of the work in this field has been for military applications, however, in recent years, breakthroughs in the technology clearly indicate that commercial applications will soon be possible, as costs continue to decrease. HP believes that mmWave will play a particularly important role in wireless interconnects and in high bandwidth data delivery.

Governments around the world have a key role to play in advancing this important technology. The practical reality is that companies like HP will invest in the technologies only if there is some certainty that the same frequencies will be available under compatible rules in all major market-places worldwide.

II. HP'S VIEWS ON ALLOCATION OF >40 GHz FREQUENCIES

In October, 1994, the Federal Communications Commission (FCC) issued a proposal for rule-making to permit radio frequencies above 40 GHz (ET Docket NO 94-124, RM-8308). HP filed comments strongly supporting the Commission's proposal, and continues to work the FCC and other U.S. government agencies on this issue. A decision is likely during the autumn of this year. As noted in the above referenced Public Notice, the European Conference of Postal and Telecommunications Administrations ("CEPT") representatives and other European officials met with representatives of the FCC and National Telecommunications Information Administration (NTIA) in Washington, D.C., in May 1995, at which time the latest version of the European Frequency Allocation Table was released. HP commends the leaders of these government organizations in Europe and the U.S. for establishing bilateral communications and including the private sector's input in decision-making processes. We believe these are important steps in attaining global alignment on spectrum allocation.

The following chart illustrates HP's proposal for 40-100 GHz:



III. THE ENTIRE 59-64 GHz BAND SHOULD BE PRESERVED FOR UNLICENSED BROADBAND USES

HP believes that technologies using the 59-64 GHz have the potential to create important new markets, not only for HP, but many other companies in a wide variety of industries. HP specifically believes that mmWave will play a particularly important role in wireless interconnect and high bandwidth data delivery.

However, internationally operable equipment is imperative in order to make this possible. The U.S. has taken a leadership role in identifying the necessary spectrum, and starting the process to make it available to the private sector. It is HP's belief that 5 GHz of wireless bandwidth will be needed to accommodate all anticipated uses, and dividing the band would eliminate its potential.

Significant progress in the development of this technology has occurred since the European CEPT Recommendation 22-30 was first developed in 1990. However, the revisions to the European Frequency Allocation Table, in 1995 do not reflect the progress toward commercial applications. HP respectfully urges the CEPT to revisit allocation of the 59-64 GHz band to align with U.S. proposals that 59-64 GHz be allocated for unlicensed uses.

IV. EUROPEAN ALLOCATION FOR 56-59 GHz SHOULD BE CONSIDERED IN LIGHT OF THE UNIQUE PROPERTIES OF THE OXYGEN ABSORPTION BAND

The frequencies between 56 and 64 GHz--known as the oxygen absorption band--have long been recognized as having unique properties. Due to absorption by atmospheric oxygen, waves transmitted at low power levels will not travel beyond about one kilometer. Interference between separated transmitters becomes unlikely, and ground-to-satellite interference becomes impossible. Consequently, this band is naturally suited to short-range communications of many types, and

opportunities for frequency re-use abound.

HP believes that the Oxygen Band is a natural resource that should be developed worldwide in such a way as to put its natural attributes to work for the largest set of compatible applications.

We note that the internationally-allocated band 59-64 GHz is sandwiched between two "no transmit" bands, and therefore offers a unique opportunity to provide contiguous communication bandwidth of 5 GHz that is inherently suited for short-range communications. Furthermore, we note that the 56-58.2 GHz lies within the Oxygen Band, providing 2.2 GHz of contiguous communication bandwidth also well suited for short range communications. HP recommends that the CEPT should define 56-58.2 GHz as a separate band from any immediately below 56 GHz. Further, ETSI standards (ETS300-407 and ETS300-408) should be put on hold until a final determination has been made with respect to the band.

We strongly believe that if regulatory bodies around the world are able to agree on a compatible set of regulations for these two segments of the Oxygen Band, everyone would benefit.

V. MULTIPLE APPLICATIONS CAN SHARE THE BAND WITH THE ESTABLISHMENT OF COMMON OPERATIONAL RULES

We have learned through discussion with representatives of European regulatory bodies that there may be a concern in allocating the 59-64 GHz band for unlicensed use based on assumption that applications already proposed for this band would have to be re-located. However, HP strongly believes that all applications currently proposed in the European Frequency Allocation Table could compatibly share an unlicensed band if a set of agreed upon "rules of the road" were appropriately established. Whether these operating parameters are called a "common air interface" or a "spectrum etiquette," they will allow a wide variety of products and services to share the band

equitably and efficiently. Furthermore, it is critically important that such rules be compatible internationally.

HP and other members of the information industry have proposed to the FCC that it explicitly recognize the importance of a spectrum etiquette for allocation of the 59-64 GHz band in its "First Report and Order." We have further suggested that it direct interested parties in the information industry to form a working group to design such an etiquette and demonstrate its efficacy to the Commission within one year of publication of the "First Report and Order." Once approved, the industry-recommended spectrum etiquette should be incorporated by reference into the FCC Rules. The Commission should withhold type acceptance of any 59-64 GHz equipment until the spectrum etiquette has been incorporated into the Rules.

While we recognize that the specific process will be different in Europe, we strongly urge European government leaders to support the development of the appropriate set of operational rules in such a way as to be compatible with any U.S. spectrum etiquette. We believe that not only would an etiquette allow many different types of users in the band, but such an etiquette also could accommodate certain priority uses of the band, to the extent that it would be necessary.

Finally, another advantage in such a band sharing arrangement is that each application envisioned in the European Frequency allocation Table would have access to far more bandwidth than is currently being proposed.

VI. OTHER KEY POINTS IN HP'S PROPOSAL

- **Vehicular Radar** -- HP supports allocation of 76-77 GHz for vehicular radar needs, primarily

because it is compatible with European allocation plans. Furthermore, we believe that vehicular radar needs exclusive use bands, and for this particular application, band sharing would not be possible for safety reasons. On the other hand, HP opposes the proposal of several Japanese companies to allow vehicular radar in the 60-61 GHz band. Such proposals lack international compatibility. It would also be incompatible with broadband communication links that are ideally suited for this band. Furthermore, vehicular radars must be immune from interference coming from similar devices on the roadway, even when those devices are approaching at close distance. Atmospheric absorption can prevent such interference at kilometer distances, but has no effect over short ranges. Therefore, there is no benefit for this service by use of the oxygen absorption band. The band should be reserved for applications where the natural properties of atmospheric absorption confer benefits.

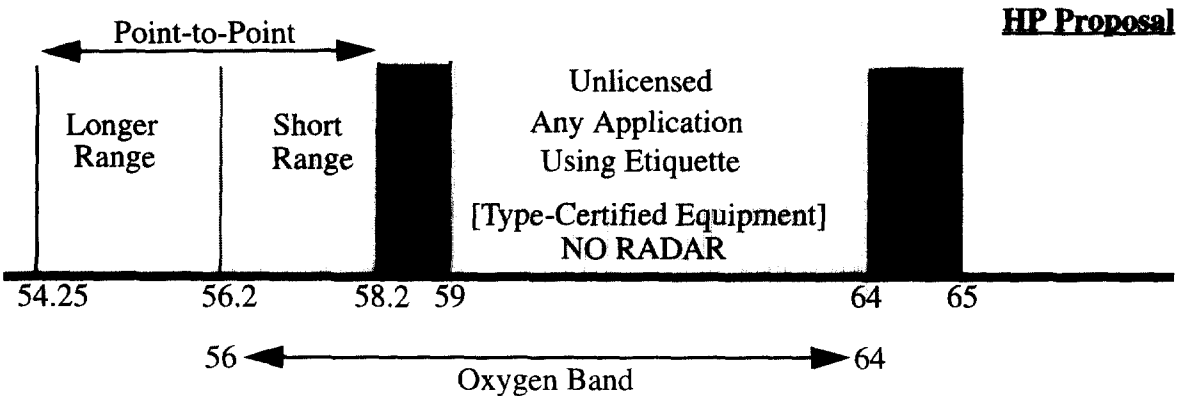
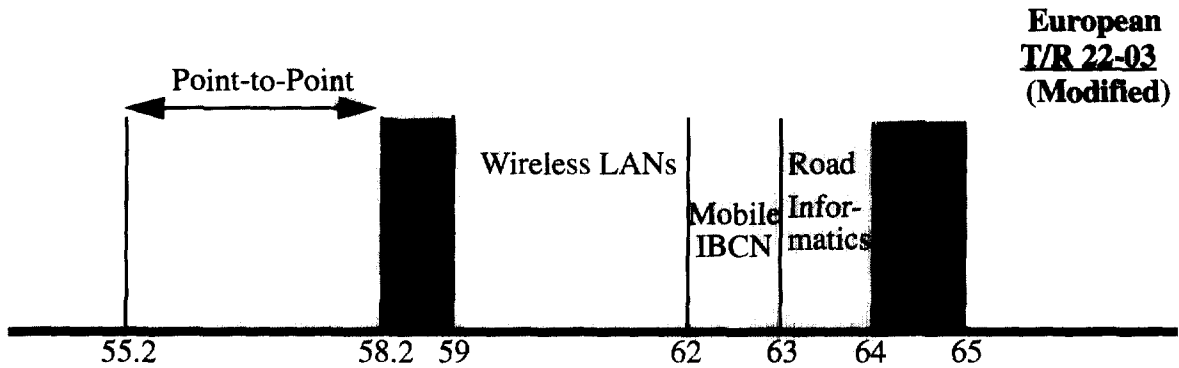
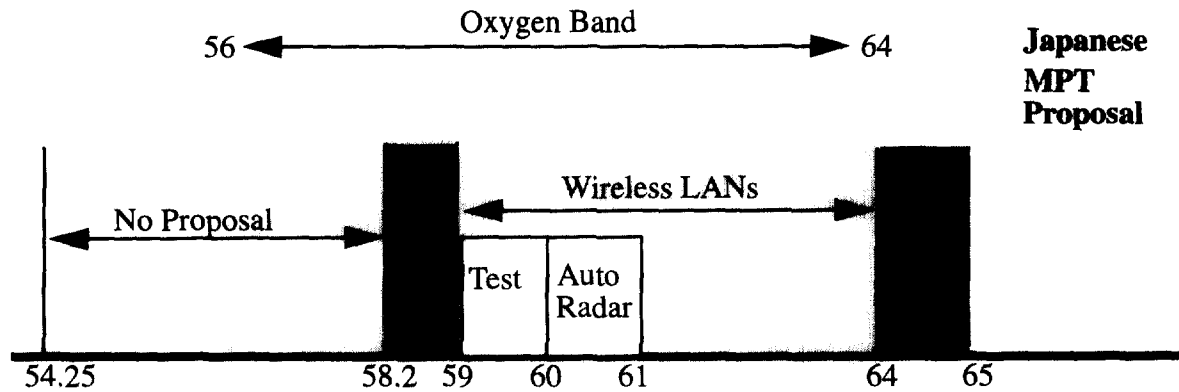
- **Multi-Point Distribution** -- HP supports the Commission's proposal to allocate 40.5-42.5 GHz for multipoint distribution systems, largely because this proposal is compatible with European MVDS allocations.
- **Point-to-Point Services** -- HP urged the Commission to find appropriate bands for point-to-point services, and endeavored to propose internationally-compatible frequencies for these important services. However, subsequent to our filing, we learned of European activities in the frequency ranges 45-58.2 GHz which differ from our proposal. For example, there is an International Telecommunications Union proposal for a "55 GHz Band" (actually 54.25 - 58.2 GHz) for point-to-point links.¹ Additionally, ETSI has proposed two bands, 54.25-57.2 GHz² and 57.2 - 58.2 GHz³ Furthermore, the Telecommunications Industry Association has pro-


1. International Telecommunications Union Document 9/BL/58-E, 18 April, 1994. This is a draft recommendation of Radiocommunication Study Group 9.
2. ETSI ETS300-407 Final Draft, October, 1994
3. ETSI ETS300-408 Final Draft, October, 1994

posed a band 55.2-58.2 GHz, presumably in concert with recent European proposals.¹ While HP strongly supports mmWave spectrum for such point-to-point links, we note that these particular proposals would establish bands which are partly outside [<56 GHz], and partly inside [56-58.2 GHz] the Oxygen Band. Since the propagation characteristics, hence the re-use distances, are different inside and outside the Oxygen Band, we would imagine that U.S. bidders might wish the opportunity to bid separately for spectrum inside or outside the Oxygen Band. For this reason, we propose dividing the internationally-allocated 54.25 - 58.2 GHz band at 56.2 GHz, as shown in the following chart:

1. Ex Parte presentation to FCC by TIA, 26 April, 1995.

Three Proposals for Segmentation of the 56 - 64 GHz Oxygen Absorption Band



 = All Emissions Prohibited

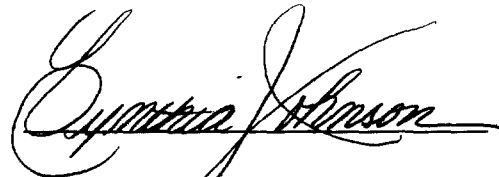
VII. CONCLUSION

HP strongly supports efforts to harmonize the allocation of spectrum in the frequencies above 40 GHz, and to ensure that operational rules are compatible. We firmly believe that there is great potential in making these valuable spectrum bands available to the private sector, and only through harmonization will that potential be fully realized. We are fully committed to working with government representatives around the world to ensure that harmonization in both allocation and operational rules is developed in a thoughtful, and timely manner.

Respectfully submitted,

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